

**U.S. Army Corps of Engineers
Omaha District**

**Technical Project Planning
Meeting Package
Northwest Maneuver Area
FUDS ID F10OR020801**

**Site Inspections at Multiple Sites, NWO Region
Formerly Used Defense Sites, Military Munitions
Response Program**

**Contract No. W912DY-04-D-0010
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Shaw® Shaw Environmental, Inc.

9201 East Dry Creek Road
Centennial, CO 80112

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- Site Information Worksheet
- MRSP Data Gaps
- HRS Data Gaps

ABBREVIATIONS AND ACRONYMS

°F	degrees Fahrenheit
AOC	area of concern
ASR	Archives Search Report
bgs	below ground surface
BLM	Bureau of Land Management
CSM	Conceptual Site Model
DQO	Data Quality Objective
FS	Feasibility Study
FUDS	Formerly Used Defense Site
HRS	Hazard Ranking System
lb	pound
MC	munitions constituents
MEC	munitions and explosives of concern
mm	millimeter
MRSPP	Munitions Response Site Prioritization Protocol
NBEC	nitrogen-based explosive compound
NDAI	No Department of Defense Action Indicated
NWMA	Northwest Maneuver Area
PA/SI	Preliminary Assessment/Site Inspection
PETN	pentaerythritol tetranitrate
Shaw	Shaw Environmental, Inc.
SI	Site Inspection
SQL	sample quantitation limit
SSWP	Site-Specific Work Plan
T&E	threatened and endangered
TPP	Technical Project Planning
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
UXO	unexploded ordnance

Site: Northwest Maneuver Area

Location: Bend, Oregon

USACE District: Seattle

TPP #1 Meeting Location: Bend Senior Citizen Center, Bend, Oregon

TPP #1 Meeting Date: April 26, 2007

AGENDA

Thursday April 26, 2007

- **Convene at Bend Senior Citizen Center**
 - **Introductions**
 - **Review Site Inspection Objectives**
 - **Goals, Objectives, and Roles & Responsibilities**
 - **Site Inspection Process**
 - **Technical Project Planning (TPP) Process**
 - **Review of Background Information**
- **Technical Project Planning Discussion**

- **Public Meeting**

1.0 Administrative Information

The Technical Project Planning (TPP) Memorandum is one in a series of documents used during the Site Inspection (SI) process to document the information collected and processes used to evaluate Formerly Used Defense Sites (FUDS) for the possible presence of munitions and explosives of concern (MEC) and/or munitions constituents (MC). TPP Meeting information provided in the Memorandum reflects both the original version of information shared with meeting participants, as well as changes/updates to site-specific information obtained during the TPP Meeting.

The TPP Meeting for the Northwest Maneuver Area (NWMA) will be conducted on April 26, 2007, at the Bend Senior Citizen Center located in Bend, Oregon. Representatives from the U.S. Army Corps of Engineers (USACE) – Omaha Design Center and Seattle District, the Oregon Department of Environmental Quality, and Shaw Environmental, Inc. (Shaw) will be in attendance. A site tour will not be conducted as part of this meeting.

The TPP Memorandum documents discussions for the TPP Meeting and includes the sections described below:

- **Administrative Information:** includes meeting logistics and the list of attendees;
- **Site Inspection Objectives:** provides the goal and objectives of the SI, roles and responsibilities, the SI process, and the TPP process;
- **Background Information:** includes site and project history, area physical setting, a summary of previous environmental work, and an introduction to the areas of concern (AOCs) addressed by the SI;
- **Conceptual Site Model (CSM):** used to identify environmental attributes, potential human and ecological receptors in the area's environment, and the relationships between these factors;
- **Proposed Sampling Scheme:** used to describe the type and quantity of samples to be taken, and the analytical methods to be used for characterizing the AOC;
- **TPP Notes and Data Quality Objectives (DQOs):** used to capture project and site-specific information as discussed during the TPP Meeting to ensure the necessary and appropriate information is shared among meeting participants, and that meeting participants concur with the identified goal, objectives, and approach used to complete the SI process; and
- **Worksheets:** includes the **Site Information Worksheet, Draft Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps, and Hazard Ranking System (HRS) Data Gaps.**

2.0 *Site Inspection Objectives*

2.1 *Goal*

- The USACE is conducting SIs of FUDS properties to determine if any MEC or related MC is present on property formerly owned or leased by the U.S. Department of Defense.

2.2 *Objectives*

- Determine if the site requires further response action under CERCLA due to the presence of MEC or MC.
- Collect minimum information needed to:
 - Eliminate a site from further consideration if:
 - No evidence of MEC and
 - Concentrations of MC in site media samples are below background or below risk-based screening levels,
 - Determine the potential need for initiation of the Remedial Investigation/Feasibility Study (FS) if:
 - Evidence of MEC identified or
 - Concentrations of MC in site media exceed background and risk-based screening levels.
 - Determine the potential need for Time-Critical Removal Action or Non-Time Critical Removal Action based on risk to site users from MEC:
 - Provide sufficient data for the U.S. Environmental Protection Agency (USEPA) to complete the HRS
 - Evaluate the FUDS using the MRSPP.

2.3 *Roles & Responsibilities*

- **USACE:** Acts as the executing agency for the U.S. Department of Defense with regard to the FUDS program. In this role, the USACE has decision making authority and is responsible for ensuring work is conducted in accordance with applicable USACE and federal guidance. Additionally, USACE coordinates and works with project team members to meet needs expressed by regulatory agencies and stakeholders.
- **Regulatory Agency:** Participates in planning of SI activities to ensure the project meets applicable state standards and requirements.
- **Property Owner(s):** Provides available and pertinent information about the area, provides insight on current and anticipated future land uses for the property, and participates in project team discussions.
- **Shaw:** As a contractor to the USACE, conducts work on behalf of the USACE, provides TPP materials, makes site information available to the project team through a web-based information portal, and conducts and reports SI activities.

2.4 *Site Inspection Process*

- Data review,
- TPP,
- Site-Specific Work Plan,
- SI field activities – reconnaissance, sampling, and analysis, and
- SI Report.

2.5 *Technical Project Planning Process*

- Conduct TPP Meeting(s)* with key organizations and stakeholders;
- Identify stakeholder(s) concerns;
- Identify all AOCs for this SI;
- Review site information;
- Verify current and anticipated future land use;
- Develop CSM;
- Identify data gaps;
- Plan how to address data gaps;
- Develop DQOs for meeting SI requirements; and
- Concur on SI field work approach.

* Second TPP Meeting to be determined by team members during the first TPP Meeting.

3.0 Background Information

Historical information contained in this package was obtained from the *Archives Search Report Findings* (ASR) (USACE, 1995) and the *ASR Supplement* (USACE, 2004) for the Northwest Maneuver Area.

3.1 Site Name and Location

The Northwest Maneuver Area, identification number F10OR020801, is located in central to south-central Oregon and consists of approximately 8 million acres (Figure 1, “Site Location”), including portions of Jefferson, Deschutes, Crook, Grant, Lake, Harney, and Klamath counties. Encompassed in its boundary are six separate FUDS. They are as follows:

- Central Oregon Air to Air Gunnery Range F10OR017000
- Camp Abbot F10OR004100
- Fort Rock Maneuver Area F10OR018000
- Redmond Precision Bombing Range F10OR021900
- Redmond Air to Ground Gunnery Range F10OR021700
- Redmond Army Air Field F10OR002800

3.2 Range Inventory

The Northwest Maneuver Area is included in the Military Munitions Response Program Inventory in the *Defense Environmental Programs Fiscal Year 2005 Annual Report to Congress* (DoD, 2005) with range information as follows:

Range Name	Federal Facility Identification	Range Total Acres
Northwest Maneuver Area	F10OR020801	8,000,000

The range area and coordinates are listed in the ASR Supplement (USACE, 2004) as follows:

Range Name	Range Identification	Approximate Area (acres)	UTM Coordinates (meters)
Anti-tank Minefield	F10OR020801R01	18	X: 682026.58 Y: 4793815.25

Coordinates for the ranges are in Universal Transverse Mercator, Zone 11, NAD 83.

3.3 Property History

The information presented in the following sections is primarily obtained from the ASR (USACE, 1995) and the ASR Supplement (USACE, 2004).

3.3.1 Historical Military Use

- 6,890,880.08 acres of land was acquired by special use permit from the Department of Agriculture and the Department of Interior in 1943.
- Land was used by the Department of Defense (DoD) to facilitate a large scale force-on-force exercise (during September, October, and November 1943) prior to deployment of the 4th Army into its World War II theatre of operations.
- Six FUDS sites are included within the boundary of the NWMA. The NWMA consists of over 8 million acres with the inclusion of these other FUDS sites.
- The six FUDS sites include Central Oregon Air to Air Gunnery Range, Camp Abbot, Fort Rock Maneuver Area, Redmond Precision Bombing Range, Redmond Air to Ground Gunnery Range, and Redmond Army Airfield.

3.3.2 Munitions Information

- Historical records indicate that 11 intact M1B1 anti-tank training mines were found in 1987 on the property of Terry Gratrix located 6 miles northwest of the town of Christmas Valley.
- A tear drop shape AN-MK43 practice bomb was found in 1988 in the sand dunes approximately 14 miles north of the town of Christmas Valley.
- While conducting a site survey of a related FUDS property, personnel from the St. Louis District completed the site inspection for the NWMA by inspecting the property of Mr. Terry Gratrix on May 22, 1995. Four additional anti-tank training mines were observed. It was noted that the mines were apparently excavated and removed to the location where they were observed.

- Records indicate that the units trained with blanks and inert munitions during the 1943 maneuvers. However according to press accounts, live ammunition was on hand but it was not to be fired.

3.3.3 Ownership History

- DoD acquired 6,890,880.08 acres of land in 1943 from the Department of Agriculture and the Department of Interior under special use permit.
- Prior to DoDs use of the NWMA, the site was comprised of six defense sites, small farms and ranches, and federal resource agencies owned/managed lands.
- Currently the vast majority of the site is Federally owned open range and forest land. However, private entities do own portions.

Physical Setting

3.3.4 Topography and Vegetation

- Located in the Columbia Intermotane province and the Basin and Range Province of the Columbia Intermountain Physiographic province.
- Bedrock in the area consists almost entirely of basalt lava flows. The lave plateaus are interspersed with many rhyolitic deposits and ryolite volcanic structures. There are some deposites of light colored volcanic ash also.
- The low topographic features are sand dunes, alkali lakes, and shorelines of ice-age lakes. The elevated features are volcanic in origin, such as the ash ring volcano.
- The site is currently used for cattle grazing, agriculture, and timber production purposes.

3.3.5 Surface Water

- The large area is drained by many streams with the Deschutes and the John Day Rivers being the largest. Both rivers drain north to the Columbia River.
- Many of the sites are dry lake beds for much of the year.

3.3.6 Sensitive Environments

- The United States Fish and Wildlife Service indicated the following Federally protected species may be found in the vicinity of the NWMA:
 - Columbian white-tailed deer (endangered)
 - Bald eagle (threatened)
 - Brown pelican (endangered)
 - Marbled murrelet (threatened)
 - Snake River Chinook salmon (threatened)
 - Snake River sockeye salmon (endangered)

- Oregon silver spot butterfly (threatened)
 - White-footed vole (candidate)
 - Pacific-western big eared bat (candidate)
 - Northern red-legged frog (candidate)
 - Tall bugbane (candidate)
 - Howell’s montia (candidate).
- The Oregon Department of Fish and Wildlife indicated the following State threatened and endangered species occur in the vicinity of the site:
 - Bull trout (critical)
 - Cascades frog (critical)
 - Spotted frog (critical)
 - American peregrine falcon (endangered)
 - Bald eagle (endangered)
 - Northern spotted owl (threatened)
 - Black-backed woodpecker (critical)
 - Burrowing owl (critical)
 - Ferruginous hawk (critical)
 - Flammulated owl (critical)
 - Lewis’ woodpecker (critical)
 - Northern goshawk (critical)
 - Pileated woodpecker (critical)
 - Red-necked grebe (critical)
 - Three-toed woodpecker (critical)
 - White-headed woodpecker (critical)
 - American martin (critical)
 - Pacific western big-eared bat (critical)
 - Wolverine (threatened).

Additional information will be acquired from the Oregon Department of Fish and Wildlife and the U.S. Fish and Wildlife Service.

- Table 1 presents the Army’s checklist for Important Ecological Places (IEPs). Based on the above information, the NWMA is considered an IEP.

3.3.7 *Climate*

- Precipitation is seasonal with a dry period and warm temperatures in summer with a cold and slightly wetter winter.
- The average annual precipitation ranges from about 10 inches per year along the western part of the area to approximately 25 inches per year in the southeastern part of the site
- Average snowfall for the area is about 17 inches.

- The average maximum and minimum temperatures are 63 degrees Fahrenheit (°F) and 33°F, respectively.
- The average wind speed is 7 miles per hour.

Geologic and Hydrogeologic Setting

3.3.8 Bedrock Geology

- Bedrock beneath the NWMA consists almost entirely of basalt lava flows interspersed with many rhyolitic deposits and rhyolite volcanic structures. There are also some deposits of light colored volcanic ash.
- In the southern half, the site covers an area of extensive faulting. These northwest-southeast trending faults are collectively called the Brothers fault and there are at least 25 of them present within the NWMA.
- South of the Brothers fault zone the lava plateau is broken into big fault block mountain ranges and valleys.
- North of the Brothers fault zone the lava plateau is still relatively intact and unbroken by faulting.

3.3.9 Overburden Soils

- Where there are soils present in the site area, they are very thin.
- Surface is mainly composed of various outcropping rocks, mostly basalt.
- In some areas, fault block valley floors filled with muddy sediments that were washed into them from neighboring mountains is present.
- The Miocene age fills and sediments are mostly gravelly and silty sand in nature.

3.3.10 Hydrogeology

- In the southeast the site is very dry and the rainfall is very scarce.
- Western edge of the site is semi-arid.
- Groundwater studies in the area are nonexistent.

3.4 Population and Land Use

3.4.1 Nearby Population

- Portions of the NWMA are included in Jefferson, Deschutes, Crook, Grant, Lake, Harney, and Klamath counties.
- A representative area for the NWMA is located near the City of Bend, Oregon in Deschutes county.

- Approximately 67,125 residents reside in Bend per 2005 Bureau of Census population estimates (www.census.gov).

3.4.2 Land Use

- The NWMA contains several small communities and incorporated areas.
- Vast majority of the site is Federally owned open range and forest land.
- Current land use is for cattle grazing, agriculture, timber production purposes, and recreation.
- Eastern portion of the site is used for cattle grazing and the western portion supports a dense pine forest.

3.4.3 Area Water Supply

- Domestic wells located within 4 miles of the site are presented on Figure 2, “Domestic Wells Within 4-Mile Radius”.

3.5 Previous Investigations for MC and MEC

- Figure 3, “Site Layout” and Figure 4, “Anti-Tank Minefield Current Aerial” present a layout of the NWMA.
- An ASR was issued in August 1995. The ASR documented that the NWMA was used for a military maneuver during September, October, and November 1943. Historical records indicate that no live munitions were used during the maneuvers.
- There are several documented reports of ordnance being found. These include practice anti-tank training mines and an Mk43 practice bomb.
- An ASR Supplement was completed in 2004 and indicated one range, the Anti-tank Minefield (USACE, 2004).
- The munitions potentially used at the NWMA and the associated MC are presented in Table 2.

3.6 Other Land Uses that May Have Contributed to Contamination

- Activities from the other six FUDS located within the boundary of the NWMA.

3.7 Other Investigations

- Two (Fort Abbot and Central Oregon Air to Air Gunnery Range) of the six FUDS located within the NWMA boundary had ASR and ASR Supplements conducted and are currently being investigated under the Military Munitions Response Program.
- The Redmond Army Airfield was used in conjunction with a remote bombing range and an air-to-ground gunnery range.

- Consisted of 1,730 acres Bureau of Land Management land that was transferred to the Army Air Force April 25, 1945.
- Site determined excess September 1946
- Conveyed property to the City of Redmond on October 3, 1947.
- Currently used as the Redmond Municipal Airport.
- Findings and Determination of Eligibility signed November 2, 1986 (NDAI)
- The Fort Rock Maneuver Area was used by the U.S. Army, Army Ground Forces as a maneuver area from July 1943 to April 1945.
 - Consisted of 275,000 acres Department of Agriculture and Department of Interior land that were transferred under special use permit to the DoD in July and October 1943.
 - The DoD relinquished portions of the site in December 1944 and April 1945.
 - Findings and Determination of Eligibility signed May 27, 1989 (NDAI)
- The Redmond Air to Ground Gunnery Range was used by the Army Air Corps for an aircraft gunnery range.
 - Consisted of 10,745 acres Bureau of Land Management land acquired on August 14, 1943 and 2,351 acres of privately-owned lands also acquired in 1943.
 - Site determined excess September 1946
 - Findings and Determination of Eligibility signed July 14, 1989 (NDAI)
- The Redmond Precision Bombing Range was used by the U.S. Army Air Corps for an aircraft bombing range.
 - Consisted of 1,266 acres Bureau of Land Management land that were transferred to the Army Air Force August 14, 1943 and 1,335 acres of private land acquired also in 1943.
 - Site determined excess October 1946
 - Findings and Determination of Eligibility signed July 14, 1989 (NDAI)

4.0 *Conceptual Site Model*

4.1 *Overview*

A site-specific CSM summarizes available site information and identifies relationships between exposure pathways and associated receptors. A CSM is used to determine the data types necessary to describe site conditions and quantify receptor exposure, and discusses the following information:

- Current site conditions and future land use;
- Potential contaminant sources (e.g., metals and explosives from bombs);
- Affected media;
- Governing fate and transport processes (e.g., surface water runoff and/or groundwater migration);
- Exposure media (i.e., media through which receptors could contact site-related contamination);
- Routes of exposure (e.g., inhalation, incidental ingestion, and dermal contact); and
- Potential human and/or representative ecological receptors at the exposure point. Receptors likely to be exposed to site contaminants are identified based on current and expected future land uses.

The CSM is evaluated for completeness and further developed as needed through TPP Meetings and additional investigation.

4.2 *Background*

- During the months of months of September, October, and November 1943, the 4th Corps of the U.S. Army engaged in a series of war maneuvers on 8 million acres of Oregon land. The military units participating in the maneuvers reportedly carried live ammunition into the field to create an atmosphere of realism; however, all records indicate it was not fired. Historical documentation reports only practice ammunition was used. Even the bombers participating in the exercises dropped bags of flour to mark the location of hits. While some live fire was found in the NWMA, indications are this material was overflow from the live fire exercises performed on one of the six FUDS within the boundary of the NWMA.

4.2.1 *History of use*

- Used during September, October, and November 1943 by the 4th Corps of the U.S. Army for a series of war maneuvers.
- There are several documented reports of ordnance being found on the NWMA.

- Eleven intact M1B1 anti-tank training mines were found in 1987 on the property of Mr. Terry Gratrix located outside the town of Christmas Valley, Oregon.
- In 1988 in the sand dunes near the town of Christmas Valley, a tear drop shape MK43 practice bomb was discovered.
- The USACE St. Louis District located 4 additional anti-tank mines on the property of Mr. Gratrix during a site visit the week of May 22, 1995.
- The Lakeview District Bureau of Land Management (BLM) office reported an anti-personnel fragmentation bomb was found in 1986 near Silver Lake.
- The Lakeview District BLM office reported ordnance was found in the Lake Abert area approximately 1973.
- The Prineville District BLM office reported ordnance was found in the Milican area (timeframe unknown).
- Deschutes County Emergency Services reported artillery round found west of Sunriver, Oregon (timeframe unknown).
- Deschutes County Emergency Services reported ordnance found in sand dunes approximately 4 miles west and one mile north of Alfalfa, Oregon (timeframe unknown).
- Sunriver Nature Center spent mortar and rocket rounds found near a cliff northwest of the airstrip (timeframe unknown).
- Bend District office reported a bazooka round was located approximately 1-1/2 miles west of Sunriver. (timeframe unknown).

4.2.2 Munitions and Associated MC

Area of Concern	Munitions	Munitions Constituents
Anti-tank Minefield	Practice Land Mines (M1B1)	Sheet metal (chromium, iron, copper, lead, manganese, and nickel)
	Fuze (M1) .32 caliber blank	Lead and aluminum Black Powder Red phosphorus

Additionally within the NWMA, and mainly near the town of Christmas Valley, the ASR and ASR Supplement report that the following munitions and associated MC were found.

Munitions	Munitions Constituents
.30 and .45 caliber blanks	Lead, single-base (nitrocellulose) or double-base (nitrocellulose and nitroglycerin) powder
4.5-pound Navy practice bomb (AN-Mk 43)	Cast iron
Spotting Charge	Black powder (potassium nitrate, sulfur, and charcoal)

4.2.3 Previous MEC Finds

- Anti-tank mines and practice bomb near the town of Christmas Valley.

4.2.4 Previous MC Sample Results

- None.

4.2.5 Current and Future Land Use

- The NWMA contains several small communities and incorporated areas.
- Vast majority of the site is Federally owned open range and forest land.
- Current land use is for cattle grazing, agriculture, and timber production purposes, this should continue into the future.

4.2.6 Ecological Receptors

- This FUDS does qualify as an IEPS because the habitat is known to be used by state and/or federal designated or proposed designated endangered or threatened species.

4.3 MEC Evaluation

- Only documented use was from September to November 1943 for troop maneuvers using blank ammunition and sacks of flour for bombs.
- A 4.5-pound Navy practice bomb was found. No other MEC or munitions debris associated with the bomb has been reported.
- Practice anti-tank mines were found in Christmas Valley. No other MEC or munitions debris associated with the mines has been reported.
- The fuze contained black powder or red phosphorus.
- The vast majority of the site is Federally owned open range and forest land. Other portions are privately owned.
- Site is currently used for cattle grazing, agriculture, timber production, and recreation.

- Eastern portion of the site is used for cattle grazing and the western portion supports a dense pine forest.
- Portions of the site have restricted access.

4.3.1 MEC Evaluation/Investigation Needed

- Visual field reconnaissance of Christmas Valley and the 1943 maneuver route will be conducted by a qualified unexploded ordnance (UXO) technician with the aid of a hand-held magnetometer.

4.4 MC Pathway Evaluation

- Munitions debris from practice anti-tank mines in the site soils near Christmas Valley consists mainly of steel, chromium, copper, iron, lead, manganese, and nickel.
- Munitions debris from 4.5-pound practice bomb found by a landowner in the sand dunes near the town of Christmas Valley consists mainly of steel, chromium, copper, iron, lead, manganese, and nickel.
- Small arms casings consisting of lead.

4.4.1 Overview of Pathways

Affected media and potential pathways for MC include:

- Soil: Soil is the primary medium of concern due to the presence of munitions debris (i.e., landmines) and possibly MC in the soil resulting from the discharge of munitions. The soil also serves as a secondary source of air contamination.
- Sediment: Sediment is a potentially affected media.
- Surface Water: Surface water is a potentially affected media.
- Groundwater: Groundwater is a potentially affected media since the migration of MC directly to groundwater from soil is considered to be possible.
- Air: Air is a possible completed pathway through inhalation of contaminated soil particles. The pathway is considered to be complete.
- An analysis of exposure pathways and receptors for MEC is provided in Table 3.

4.4.2 Terrestrial Pathway

4.4.2.1 Sources of MC

- MC from the spotting charges could include black powder.
- MC from the landmine fuze could include black powder or red phosphorous.

- Most substantiated reports of munitions were found near the town of Christmas Valley.

4.4.2.2 Migration Pathway

- Wildlife and livestock in the area potentially may be exposed to MC through soil.
- Humans may come in contact with MC contamination through intrusive and nonintrusive work and recreational activities in areas where munitions debris may be present.

4.4.2.3 Land Use and Access

- The NWMA contains several small communities and incorporated areas.
- Current land use is for cattle grazing, agriculture, timber production, and recreation and it is assumed that the land will be used the same in the future.
- Some of the land is privately owned. The vast majority of the site is Federally owned open range and forest land.
- Access to portions of the site is restricted.

4.4.2.4 Human Receptors

- The most likely current and future human receptors at the site would be the landowners and recreational users.

4.4.2.5 Ecological Assessment

- Site has been determined to be an IEP based on potential for threatened and endangered (T&E) to use the property.
- The potential T&E species are listed in Section 3.3.6.
- The pathway for ecological receptors is complete.

4.4.3 Surface Water/Sediment Pathway

Surface water and sediment is a completed pathway at the NWMA. The large area is drained by many streams with the Deschutes and the John Day Rivers being the largest. Both rivers drain north to the Columbia River.

4.4.3.1 Sources of MC

- Metals (chromium, copper, iron, lead, manganese, and nickel).

4.4.3.2 Migration Pathway

- The potential routes of human exposure to contaminated surface water include incidental ingestion of, dermal contact with, and inhalation of surface water.
- The potential routes of livestock and wildlife (including aquatic organisms) exposure to contaminated surface water include ingestion of and direct contact with surface water.

- The potential routes of human exposure to contaminated sediment include incidental ingestion of and dermal contact with sediment.
- The potential routes of livestock and wildlife exposure to contaminated sediment include ingestion of and direct contact with sediment.

4.4.3.3 Surface Water Use and Access

- Recreation and wildlife.

4.4.3.4 Human Receptors

- Residents and recreational users.

4.4.3.5 Ecological Assessment

- According to the ASR, federal and State T&E species may be present in the vicinity of the site.

4.4.4 Groundwater Pathway

- The potential routes of human exposure to contaminated groundwater include ingestion, dermal contact, and inhalation where groundwater is used as a water supply.
- The potential route to wildlife is through direct exposure and ingestion.

4.4.5 Air Pathway

- Air is a possible completed pathway through inhalation of contaminated soil particles. Exposure to the air pathway is considered in the human health screening values and is not assessed further here.

4.4.6 MC Evaluation/Investigation Needed

- One surface soil sample is planned from near the location of the anti-tank mines located near Christmas Valley. The sample would be analyzed for select metals (chromium, copper, iron, lead, manganese, and nickel) and explosives.
- One surface soil sample is planned from near the location of the sand dunes where the rocket was located if additional evidence of MEC is found. The sample would be analyzed for select metals (chromium, copper, iron, lead, manganese, and nickel) and explosives.
- Two contingent surface soil samples are planned if indications of MEC are found in the areas where the 1943 maneuver occurred. The samples would be analyzed for select metals (chromium, copper, iron, lead, manganese, and nickel) and explosives.
- One contingent sediment sample will be collected near Christmas Valley in an area within and downgradient of any MEC findings, if sediment is present. The sample would be analyzed for select metals (chromium, copper, iron, lead, manganese, and nickel) and explosives.

- Ten background soil and one background sediment sample (if a sediment sample is collected) will also be collected. The samples would be analyzed for select metals (aluminum, chromium, iron, copper, lead, manganese, and nickel) and explosives.
- No surface water or groundwater samples will be collected from the NWMA.
- No air samples will be collected from the NWMA. Analytical results from soil samples can be used in the evaluation of the air pathway.

4.5 CSM Summary/Data Gaps

- MEC was established when training anti-tank mines were found near Christmas Valley by a private resident and by the USACE St. Louis personnel. Additionally, an Mk43 practice bomb was discovered near Christmas Valley.
- MC from the fuze and spotting charges could include black powder, and red phosphorous. Metals from anti-tank mines and a bomb body could include chromium, iron, copper, lead, manganese, and nickel.

5.0 *Proposed Sampling Scheme*

5.1 *Proposed Field Investigation*

- The proposed field investigation and sampling to be conducted at the Northwest Maneuver Area is detailed below and summarized in Table 4. The investigation approach and sampling locations will be defined in more detail in a Site-Specific Work Plan (SSWP) that will be submitted to Oregon Department of Environmental Quality and other stakeholders for review. The SSWP will reference technical details including sampling and analytical methods that are described in the Type I Work Plan, Site Inspections at Multiple Sites prepared by Shaw and submitted to U.S. Army Corps of Engineers (USACE) as final in February 2006.

5.2 *Reconnaissance*

- A field reconnaissance survey by a trained unexploded ordnance (UXO) technician using a hand-held magnetometer will be performed in various locations near the town of Christmas Valley and in areas where the 1943 maneuvers took place to assess the presence or absence of munitions and explosives of concern (MEC) and to document the current site conditions. Several transects will be walked during which visual observations and magnetic anomalies will be noted. Transects will be recorded using a global positioning system, and appropriate features influencing the survey will be noted, such as vegetation density and type, topography, etc. If MEC is found, the qualified UXO technician will attempt to make a determination of the hazard, and appropriate notifications will be made as detailed in the Type I Work Plan, Site Inspections at Multiple Sites and SSWP. Digital photographs will be taken to document significant features.
- Visual reconnaissance surveys will also be performed at other sampling locations to aid in sample location selection and to allow the sampler to work safely.

5.3 *Soils*

- Surface soil samples will be collected at a depth of approximately 0 to 6 inches below ground surface (bgs). Surface soil samples will be composite samples (7-point, wheel pattern with a 2-foot radius). No subsurface samples are planned.
- One surface soil sample is planned from near the location of the anti-tank landmines located near Christmas Valley. The sample would be analyzed for select metals (chromium, iron, copper, lead, and nickel) and explosives.
- One surface soil sample is planned from near the location of the sand dunes where the rocket was located if additional evidence of MEC is found. The sample would be analyzed for select metals (chromium, iron, copper, lead, and nickel) and explosives.
- Two contingent surface soil samples are planned if indications of MEC are found in the areas where the 1943 maneuver occurred.

5.4 *Sediment*

- One contingent sediment sample will be collected near Christmas Valley in an area within and downgradient of any MEC findings, if sediment is present. The sample would be analyzed for select metals (chromium, copper, iron, lead, manganese, and nickel) and explosives.
- Sediment samples will be collected from 0 to 2 inches depth but will be discrete samples in order to retrieve material from specific, localized, water collection areas.

5.5 *Groundwater and Surface Water*

- No groundwater or surface water sampling is planned.

5.6 *Analyses*

- Surface soil samples will be analyzed for select metals (chromium, copper, iron, lead, manganese, and nickel) by USEPA SW-846 Method 6020A. Sediment samples will also be analyzed for the same metals by Method 6020A. Soil and sediment samples will also be analyzed for explosives by USEPA SW-846 Method 8330A and for nitroglycerine and PETN by Method 8330A (Modified).

5.7 *Background Sampling*

- Ten background soil and one background sediment sample will be collected. The composite soil sample locations will be determined in the field in areas that do not appear to have been impacted. The background surface soil and sediment samples will be analyzed for Target Analyte List metals (aluminum, chromium, copper, iron, lead, manganese, and nickel). The surface soil background samples will be used to develop a 95th upper tolerance limit for comparison of metals soil concentrations at the target areas. The background sediment sample data will provide data to compare sediment samples to background values.

6.0 *TPP Meeting Notes and Data Quality Objectives*

- The U.S. Army Corps of Engineers (USACE) Technical Project Planning (TPP) process is a four-phase process:
 - Identify the current project,
 - Determine data needs,
 - Develop data collection options, and
 - Finalize data collection program.
- The purpose of TPP is to develop data quality objectives (DQOs) that document how the project makes decisions.
- DQOs are intended to capture project-specific information such as the intended data use(s), data needs, and how these items will be achieved.
- Information captured through DQOs will be used as a benchmark for determining whether identified objectives are met.

TPP Phases

Phase I: Identify the Current Project

1. Team members identified to date include: USACE – representatives from the Omaha Design Center and the Seattle District, Shaw Environmental, Inc. (Shaw) as a USACE contractor, Oregon Department of Environmental Quality, and the leaseholders.

Question: Is there any person or organization missing from this Team?

2. The area of concern (AOC) identified is:

- Anti-tank mine field

Question: Are there any other AOCs to be identified?

3. Based on information available about the site and shared through discussions with the USACE, are there concerns about this area that have been expressed by the Oregon Department of Environmental Quality or USEPA, as well as by landowners.

Question: Are there additional concerns or issues from landowners or other stakeholders regarding the Northwest Maneuver Area?

Question: Are there any administrative or stakeholder concerns or constraints that would prevent site inspection activities from going forward on the decision path for this site?

Phase II: Determine Data Needs

4. Existing site information includes an Archives Search Report (ASR) and ASR Supplement both prepared by the USACE in 1995 and 2004, respectively.

Question: Are there any other pertinent documents relating to the site available?

5. The site-specific approach for this Site Inspection (SI) involves collating and assessing available site information, to include site geology, hydrogeology, groundwater, surface water, ecological information, human use/access, and current and future land uses, as well as considering conduct of site inspection and sampling activities.

Question: Are there any other site aspects/information that should be considered?

Based on site use, soil is the primary affected medium at the NWMA. Sediment/surface water is a potential pathway of munitions constituents (MC) because of the area is drained by many streams with the Deschutes and John Day rivers being the largest. Groundwater is a potential pathway since MC could be introduced to the groundwater through the soils. Air is also a potential pathway if soil particles become airborne. Considering current and future land use, primary receptors of any contaminants that may be present would most likely be residents, recreational users, and animals using the area.

Question: Do team members concur with the Conceptual Site Model (CSM)?

6. Technical considerations and/or constraints need to be identified and addressed before conducting any additional sampling, and would depend on the approach and additional data needs decided upon by team members.

Questions:

- **Are any data missing?**
- **What is the nature of needed data?**
- **What data gaps would additional data meet for making a decision about the site?**
- **Are there any considerations/constraints that need to be addressed for collecting additional data?**

Phase III: Develop Data Collection Options

7. Proposed approach:
 1. Conduct surface reconnaissance with magnetometer focused near the town of Christmas Valley and in the areas of the 1943 maneuvers.
 2. Find suitable soil background sample locations (ten total) and sample.
 3. Find suitable sediment background sample location (one total) and sample.

4. Collect composite surface soil samples and analyze for select metals (chromium, copper, iron, lead, manganese, and nickel) and explosives.
5. Collect discrete sediment sample from water collection area at one location. Analyze for select metals (chromium, copper, iron, lead, manganese, and nickel) and explosives.

Question: Based on the desired decision endpoints and information known to date, what additional information is needed to reach a determination of No Department of Defense Action Indicated (NDAI) or further action?

Question: Are the stakeholders in agreement with the sampling approach program?

Question: Are the stakeholders in agreement with the proposed approach for collecting background data?

Phase IV: Finalize Data Collection Program

8. Background data.

Site sampling results will be compared to background concentrations. Site will be considered NDAI for MC if site results do not exceed background.

Question: What background data will be used for evaluation?

Are background data sets available from previous site studies?

Are background data sets available from statewide studies?

If background data are to be collected as part of the SI, how many samples will be collected and what methods will be used to define the background range and compare to site sample results?

Soil

Sediment

Surface water

Groundwater

9. Human health screening level risk assessment.

Sample results that exceed background will be compared to screening values. Site will be considered NDAI for MC if site results do not exceed screening values (depending also on ecological evaluation). What concentrations of potential contaminants of concern (metals and explosives) lead to decision end-points for human health?

Note: Oregon State standards are provided in Tables 5, 6, and 7.

Question: Are these the correct standards to be applied as screening values for human health risk assessment?

10. Ecological screening level risk assessment.

The USACE has defined a process for conducting screening level ecological risk assessment (SLERA). A determination is first made whether the site qualifies as an Important Ecological Place (IEP). A second determination is made whether the site is managed for ecological purposes. If neither criterion is met, then a SLERA is not required and the process is limited to making observations during the site visit of any acute effects to flora and fauna that may be related to MC. If the site does qualify as an IEP or is managed for ecological purposes, site results that exceed background will be compared to ecological screening values. The site will be considered NDAI for MC if site results do not exceed screening values (depending also on human health evaluation).

Does the site qualify as an IEP?

Is the site managed for ecological purposes?

If the site is an IEP or is managed for ecological purposes, what concentrations of potential contaminants of concern (metals and explosives) lead to decision end-points for ecological risk?

Note: Oregon State standards are provided in Table 8.

Question: Are these the correct standards to be applied as screening values for ecological risk assessment?

11. Other sampling issues.

Question: Are there any additional sampling and analysis methodologies needed for all team members to arrive at a decision end-point?

Question: Given the additional sampling and analysis methodologies, are there impacts to the project schedule that need to be accommodated?

7.0 Data Quality Objectives

Upon agreement at the TPP Meeting, the following decision rules will be applied with regard to MC sampling results:

- Below risk-based screening levels = NDAI;
- Above risk-based screening levels and background = Remedial Investigation/Feasibility Study (FS).

The following expanded project objectives have been developed.

Objective 1: Determine if the site requires additional investigation or can be recommended for NDAI based on the presence or absence of munitions and explosives of concern (MEC).

DQO #1 – Utilizing trained UXO personnel and handheld magnetometers, a visual search will be conducted searching for physical evidence to indicate the presence of MEC, (e.g. MEC on the surface, munitions debris, craters, soil discoloration indicative of explosives). The visual search will consist of areas within areas near the town of Christmas Valley and the 1943 maneuver areas.

- The following reconnaissance results would support a recommendation for further action with respect to MEC:
 - Direct evidence is found of the presence of MEC (from historical records or SI activities) or evidence of potential MEC that is inconsistent with the NWMA CSM (e.g. use of munitions containing high explosives).
 - Direct evidence of MEC is not found, but abundant munitions debris is identified suggesting a potential for the presence of MEC.
- The following reconnaissance results would support a recommendation for NDAI with respect to MEC:
 - Direct evidence of MEC is not found; munitions debris is isolated and consistent with the NWMA CSM.
 - No evidence of MEC, munitions debris, or magnetic anomalies is identified.
- If there is indication that site users are exposed to MEC hazard, the site will be recommended for a removal action.

Objective 2: Determine if the site requires additional investigation or can be recommended for NDAI based on the presence or absence of MC above background and screening values.

DQO #2 – Soil and sediment samples will be collected and analytical results will be compared to background. Results from previous investigations will also be included in the evaluation

provided the analytical data meet data quality requirements developed for the SI. The following decision rules will apply:

- If sample results do not exceed background, the site will be recommended for NDAI relative to MC
- If sample results that exceed background are less than human health and ecological screening values, the site will be recommended for NDAI relative to MC.
- If sample results exceed both background and human health screening values, the site will be recommended for additional investigation.
- If sample results that exceed background exceed ecological screening values but not human health screening values, additional evaluation of the data will be conducted in conjunction with the stakeholders to determine if additional investigation is warranted.

Objective 3: Obtain data required for Hazard Ranking System (HRS) scoring.

Data required for HRS scoring are identified in the HRS Data Gaps worksheet.

Objective 4: Obtain data required for MRSPP ranking.

Data required for MRSPP ranking are identified in the MRSPP worksheet.

Next Steps

- USACE will obtain necessary rights-of-entry based on sample locations.
- Shaw will prepare the draft and final TPP Memorandum and distribute for concurrence.
- Shaw will prepare the draft SSWP for review and comment, and publish the final SSWP.
- Shaw will conduct field work.
- Shaw will prepare the draft final SI Report and submit for stakeholder review.
- USACE/Shaw will schedule a second TPP Meeting to review comments on the draft final report.

8.0 References

Interstate Technical and Regulatory Council, 2003, *Characterization and Remediation of Soils at Closed Small Arms Firing Ranges*

Shaw Environmental, Inc. (Shaw), 2006, *Type I Work Plan, Site Inspections of Multiple Sites*.

U.S. Army Corps of Engineers (USACE), 1995, *Archives Search Report (ASR) Findings, Northwest Maneuver Area, Central – South-Central, Oregon, Crook, Deschutes, Grant, Harney, Jefferson, Klamath, and Lake Counties*, Project No. F10OR020801, August.

U.S. Army Corps of Engineers (USACE), 2004, *ASR Supplement, Northwest Maneuver Area*, November.

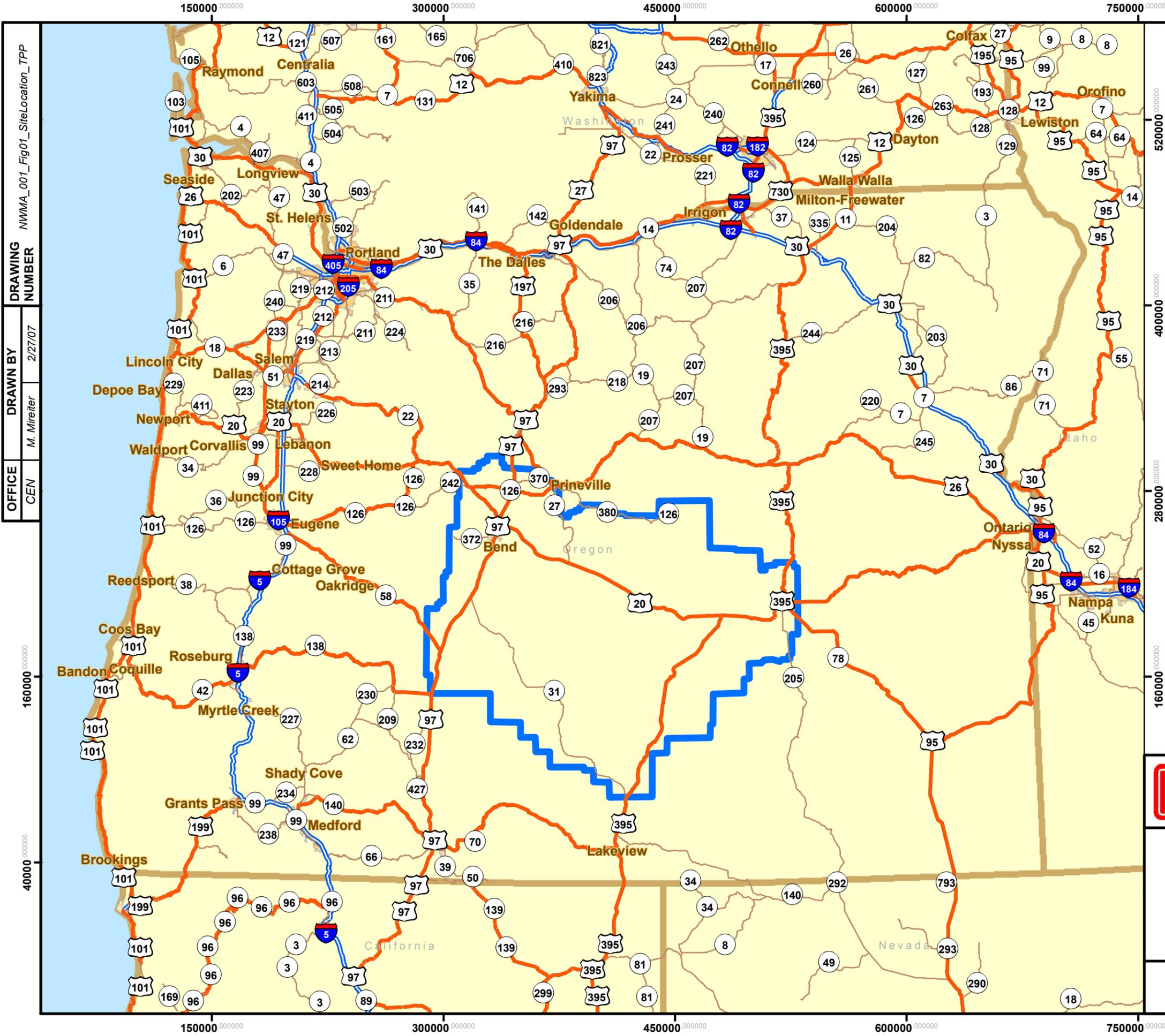
U.S. Census Bureau, Population Estimates, www.census.gov.

U.S. Department of Defense (DoD), 2005, *Defense Environmental Programs Fiscal Year 2005 Annual Report to Congress*.

Figures

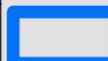
*Site Inspection
Northwest Maneuver Area*

*Technical Project Planning Meeting
April 26, 2007*

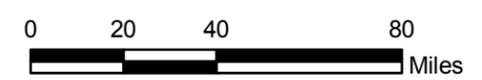
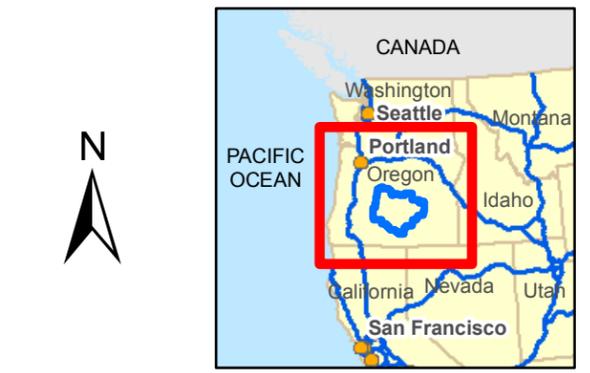


DRAWING NUMBER: NWMA_001_Fig01_SiteLocation_TPP
 DRAWN BY: M. Mireiter
 DATE: 2/27/07
 OFFICE: CEN

Legend

 Northwest Maneuver Area FUDS Boundary

NOTES:
 1) FUDS boundary was derived from the Northwest Maneuver Area ASR Supplement.



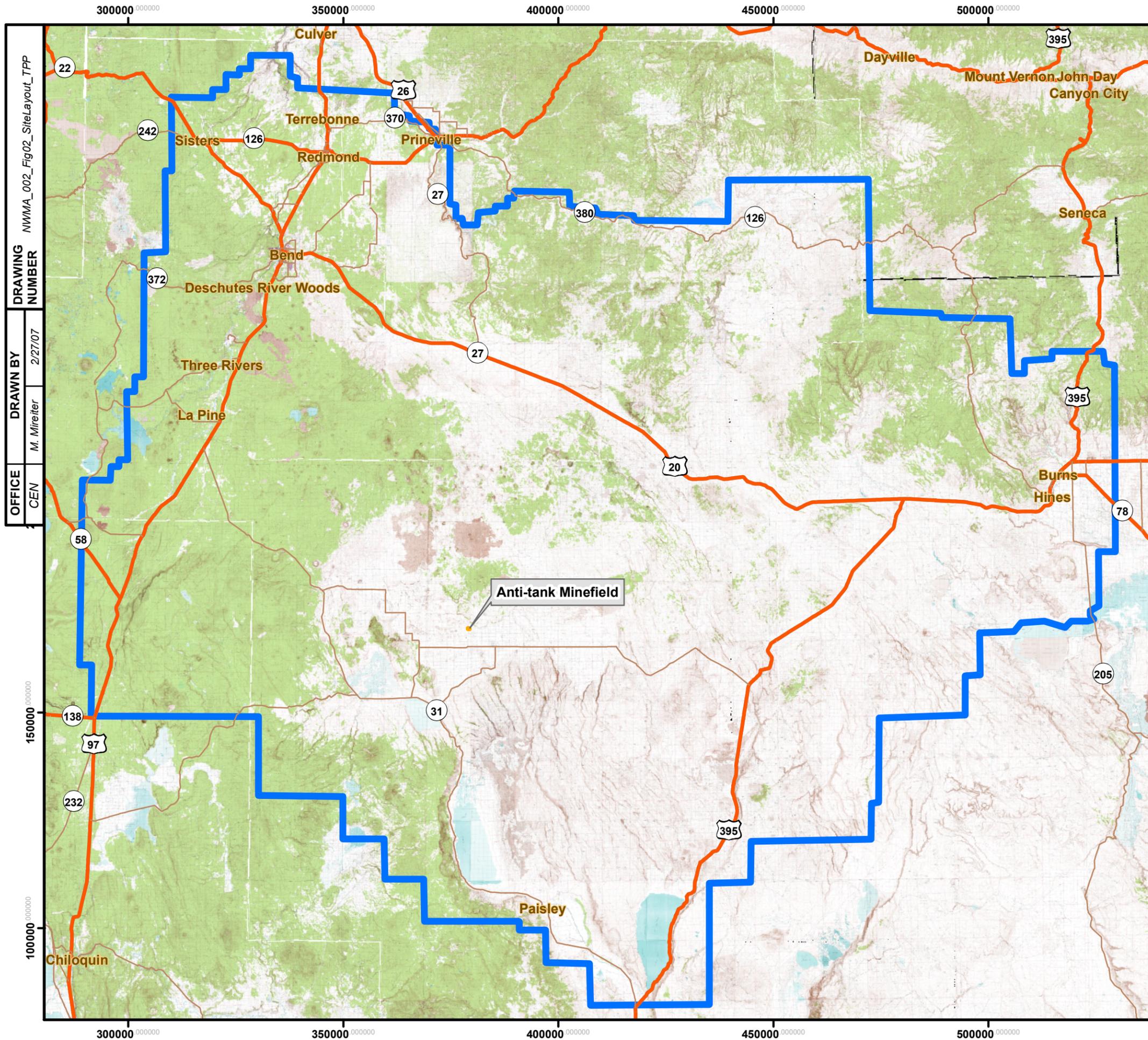
REFERENCE/PROJECTION: NAD 83 HARN Oregon Statewide Lambert



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FIGURE 1
SITE LOCATION
 NORTHWEST MANEUVER AREA





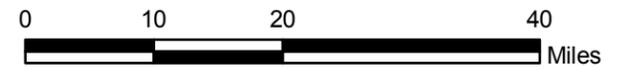
DRAWING NUMBER: NWMA_002_Fig02_SiteLayout_TPP
 DRAWN BY: M. Mireiter
 DATE: 2/27/07
 OFFICE: CEN

Legend

- Northwest Maneuver Area FUDS Boundary
- Anti-tank Minefield Boundary

NOTES:

- 1) FUDS boundary and range boundary obtained from the Northwest Maneuver Area ASR Supplement.
- 2) Topographic maps (Deschutes, Crook, Harney, Lake, Klamath, Grant, Lane, Wheeler, Linn, and Jefferson Counties) obtained from the U.S. Department of Agriculture, Service Center Agencies, 1999.



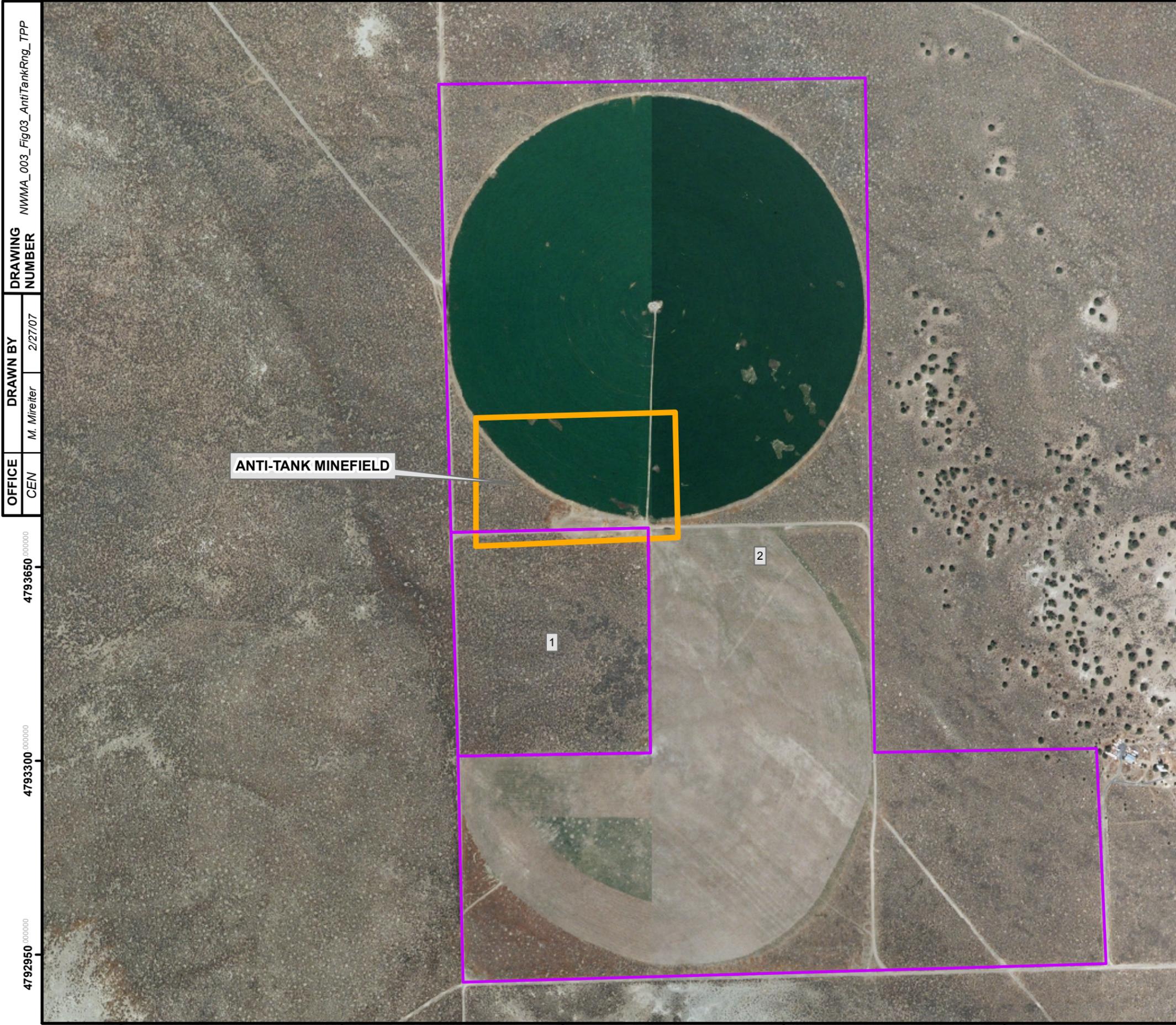
REFERENCE/PROJECTION: NAD 83 HARN Oregon Statewide Lambert

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FIGURE 2
SITE LAYOUT
 NORTHWEST MANEUVER AREA

Shaw Shaw Environmental, Inc.

681200.000000 681600.000000 682000.000000 682400.000000 682800.000000



OFFICE: CEN
DRAWN BY: M. Mireiter
DRAWING NUMBER: NWMA_003_Fig03_AntiTankRng_TPP
2/27/07

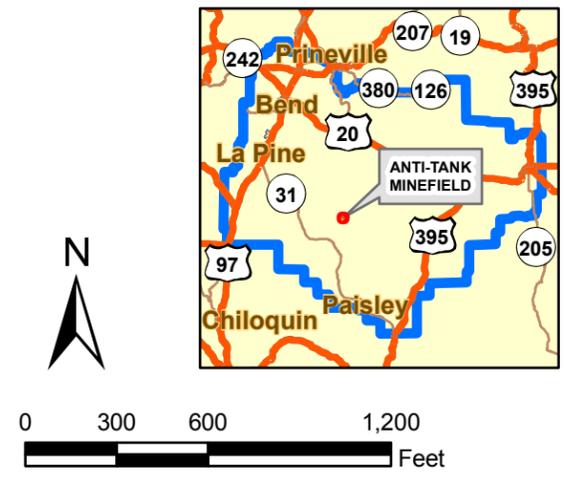
4793650.000000
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4792950.000000

Legend

- Anti-tank Minefield Boundary
- Parcel Ownership Boundary
- Parcel Designation Number

NOTES:

- 1) FUDS boundary and range boundary obtained from the Northwest Maneuver Area ASR Supplement.
- 2) Parcel boundaries and ownership information obtained from the Lake County Assessor's office.
- 3) Aerial photo (Lake County) obtained from the U.S. Department of Agriculture, Service Center Agencies; photo is from the USDA-APFO National Agricultural Inventory Project (NAIP), 2006.



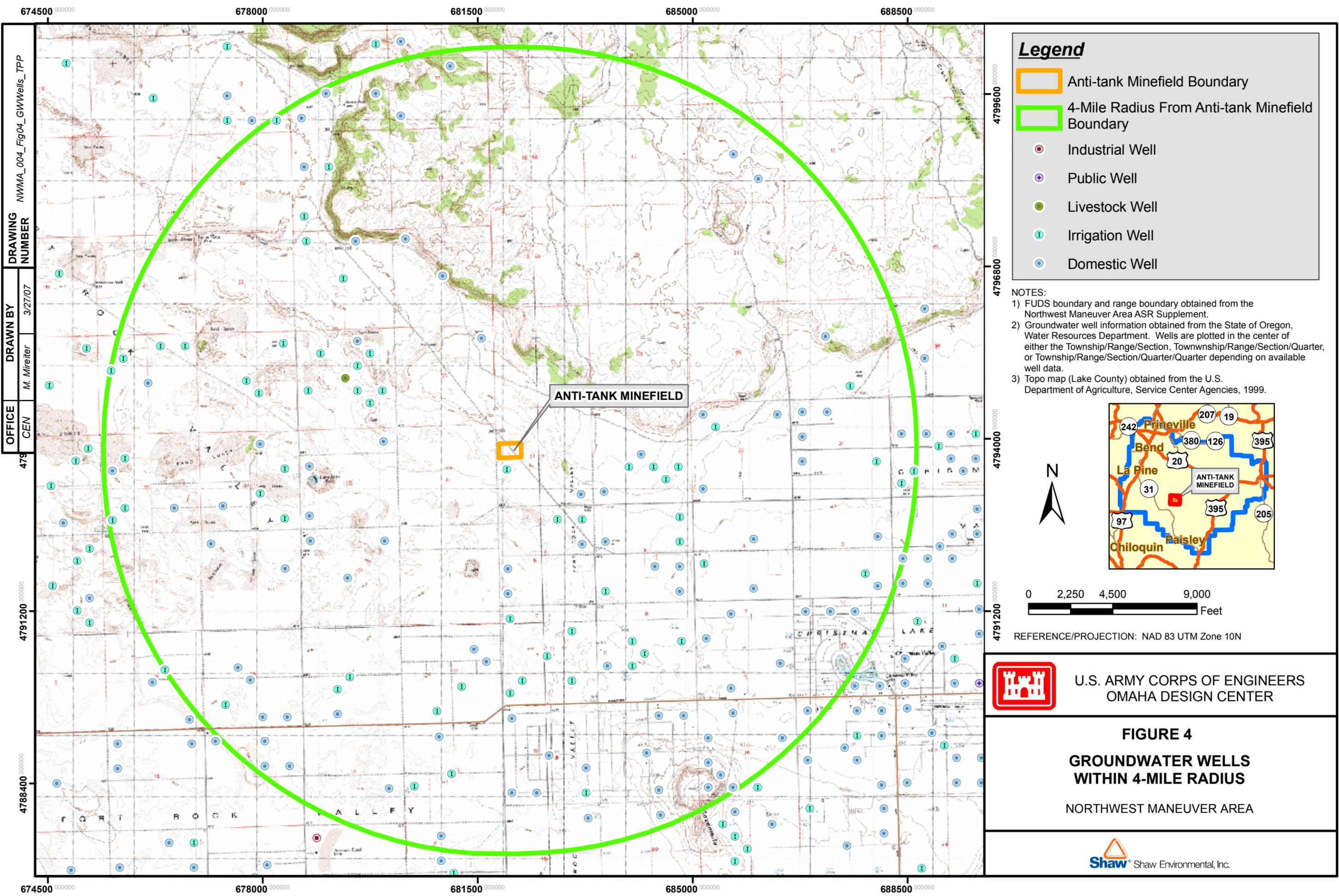
REFERENCE/PROJECTION: NAD 83 UTM Zone 10N

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FIGURE 3
ANTI-TANK MINEFIELD
CURRENT AERIAL
NORTHWEST MANEUVER AREA

Shaw Environmental, Inc.

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DRAWING NUMBER: NWMA_004_Fig04_GWwells_TPP

DRAWN BY: M. Mireiter

DATE: 3/27/07

OFFICE: CEN

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FIGURE 4
GROUNDWATER WELLS
WITHIN 4-MILE RADIUS
NORTHWEST MANEUVER AREA

 Shaw Environmental, Inc.

Tables

***Site Inspection
Northwest Maneuver Area***

***Technical Project Planning Meeting
April 26, 2007***

Table 1
Army Checklist for Important Ecological Places^a
Northwest Maneuver Area, Oregon

		Yes / No	Comments
1	Locally important ecological place identified by the Integrated Natural Resource Management Plan, BRAC Cleanup Plan or Redevelopment Plan, or other official land management plans	<input checked="" type="checkbox"/> / <input type="checkbox"/>	Site includes Deschutes National Forest, assumed to have official land management plan, as a guiding principle of the USFS is to “use an ecological approach to the multiple-use management of the National Forests.”
2	Critical habitat for Federal designated endangered or threatened species	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
3	Marine Sanctuary	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
4	National Park	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
5	Designated Federal Wilderness Area	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
6	Areas identified under the Coastal Zone Management Act	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
7	Sensitive Areas identified under the National Estuary Program or Near Coastal Waters Program	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
8	Critical areas identified under the Clean Lakes Program	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
9	National Monument	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
10	National Seashore Recreational Area	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
11	National Lakeshore Recreational Area	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
12	Habitat known to be used by Federal designated or proposed endangered or threatened species	<input checked="" type="checkbox"/> / <input type="checkbox"/>	ASR states that 1 mammal, 3 bird, 2 fish, and 1 butterfly federal T&E species may be within the Site boundary.
13	National preserve	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
14	National or State Wildlife Refuge	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
15	Unit of Coastal Barrier Resources System	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
16	Coastal Barrier (undeveloped)	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
17	Federal land designated for protection of natural ecosystems	<input checked="" type="checkbox"/> / <input type="checkbox"/>	Site includes Deschutes National Forest, assumed to have protection of natural ecosystems as policy goal – see # 1.
18	Administratively Proposed Federal Wilderness Area	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
19	Spawning areas critical for the maintenance of fish/shellfish species within river, lake, or coastal tidal waters	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
20	Migratory pathways and feeding areas critical for maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which fish spend extended periods of time	<input type="checkbox"/> / <input checked="" type="checkbox"/>	

Table 1 (Cont.)

		Yes / No	Comments
21	Terrestrial areas utilized for breeding by large or dense aggregations of animals	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
22	National river reach designated as Recreational	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
23	Habitat known to be used by state designated endangered or threatened species	<input checked="" type="checkbox"/> / <input type="checkbox"/>	ASR states that 1 fish, 2 amphibian, 2 mammal, and 14 bird state T&E species may be within the Site boundary.
24	Habitat known to be used by species under review as to its Federal endangered or threatened status	<input checked="" type="checkbox"/> / <input type="checkbox"/>	ASR states 2 mammal, 1 amphibian, 2 plant candidate federal T&E species may be within Site boundary.
25	Coastal Barrier (partially developed)	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
26	Federally designated Scenic or Wild River	<input checked="" type="checkbox"/> / <input type="checkbox"/>	The Deschutes River that flows through the Site is a federally-designated Wild and Scenic River
27	State land designated for wildlife or game management	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
28	State-designated Scenic or Wild River	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
29	State-designated Natural Areas	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
30	Particular areas, relatively small in size, important to maintenance of unique biotic communities	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
31	State-designated areas for protection or maintenance of aquatic life	<input type="checkbox"/> / <input checked="" type="checkbox"/>	
32	Wetlands	<input checked="" type="checkbox"/> / <input type="checkbox"/>	Wetlands likely along Deschutes and John Day Rivers.
33	Fragile landscapes, land sensitive to degradation if vegetative habitat or cover diminishes	<input checked="" type="checkbox"/> / <input type="checkbox"/>	Soils within some areas of the Site are generally very thin to absent, with surface outcroppings of volcanic rocks in the Camp Abbott FUDS local.

a – Based on EPA, 1990, 55 FR 51624, Table 4-23 – Sensitive Environments Rating Values, Dec. 14, 1990; EPA, 1997, ERAGS, Exhibit 1-1 List of Sensitive Environments

**Table 2
Potential MEC and MC
Northwest Maneuver Area**

Range Areas	Munitions ID	Munitions	Associated MC	Comments
Anti-Tank Minefield	Practice landmine	M1B1	Chromium, iron, copper, lead, manganese, and nickel	Made of light sheet metal
	Fuze	M1 (.32 caliber blank)	Aluminum, lead, black powder, and red phosphorus	
Maneuver Area	Small Arms	.30 and .45 caliber blanks	Brass, nitrocellulose, and nitroglycerin	
Sand Dunes	Practice Bomb	45-pound MK43	Iron	Made of cast iron
	Spotting charge		Black powder (potassium nitrate, sulfur, and charcoal)	

**Table 3
MEC and MC Exposure Pathway Analysis
Northwest Maneuver Area**

Range Area & Type	MMRP Concern	Potential Contaminant of Concern (PCOCs)	Affected Media (Potential Contaminant Sources) (Fate and Transport)	Exposure Routes and Potential Receptors			Data Gaps	Activities to Address Data Gaps (i.e., Sampling)
				Site Workers/Contractor Personnel	Residents/ General Public	Ecological (Biota)		
Anti-Tank Minefield and 1943 Maneuver Area	MEC	MEC in the form of <i>unexploded</i> practice bomb spotting charges may exist on the land surface. MEC in the form of <i>unexploded</i> practice anti-tank mines may exist on the land surface.	Surface Soil <ul style="list-style-type: none"> MEC (unexploded practice landmines and bombs) are a hazard. MEC (unexploded practice landmines bombs) reported on surface. 	<ul style="list-style-type: none"> Potentially complete pathway. Exposure routes: <ul style="list-style-type: none"> Vehicle and foot traffic 	<ul style="list-style-type: none"> Potentially complete pathway. Exposure routes: <ul style="list-style-type: none"> Vehicle and foot traffic 	<ul style="list-style-type: none"> Potentially complete pathway. Exposure routes: <ul style="list-style-type: none"> Foot traffic 	<ul style="list-style-type: none"> Locations and type of MEC 	<ul style="list-style-type: none"> Historical documents indicate that the NWMA was used from September – November 1943 for troop exercises with practice ammunition. However, ordnance has been found at the NWMA, specifically including practice anti-tank mines and a 45-pound practice bomb. A field reconnaissance survey by a trained unexploded ordnance (UXO) technician using a hand-held magnetometer will be performed in the areas of Christmas Valley and the maneuver areas to assess the presence or absence of munitions and explosives of concern (MEC) and to document the current site conditions.
			Subsurface Soil <ul style="list-style-type: none"> MEC (unexploded practice landmines and bombs) are a hazard. MEC (unexploded practice landmines bombs) reported in subsurface 	<ul style="list-style-type: none"> Potentially complete pathway. Exposure routes: <ul style="list-style-type: none"> Intrusive activities 	<ul style="list-style-type: none"> Potentially complete pathway. Exposure routes: <ul style="list-style-type: none"> Intrusive activities 	<ul style="list-style-type: none"> Potentially complete pathway. Exposure routes: <ul style="list-style-type: none"> Burrowing 	<ul style="list-style-type: none"> Locations and type of MEC 	<ul style="list-style-type: none"> Historical documents indicate that the NWMA was used from September – November 1943 for troop exercises with practice ammunition. However, ordnance has been found at the NWMA, specifically including practice anti-tank mines and a 45-pound practice bomb. A field reconnaissance survey by a trained unexploded ordnance (UXO) technician using a hand-held magnetometer will be performed in the areas of Christmas Valley and the maneuver areas to assess the presence or absence of munitions and explosives of concern (MEC) and to document the current site conditions.
	MC	Black powder, red phosphorous, sheet metal (chromium, iron, copper, lead, manganese, and nickel), steel, lead, aluminum	Soil <ul style="list-style-type: none"> Directly affected. Potential metals contamination from munitions used. Spotting charges do not contain hazardous components. Fuze does not contain hazardous substances. Fate & Transport: secondary source of potential sediment, surface water, and air contamination. 	<ul style="list-style-type: none"> Potentially complete pathway. Exposure routes: <ul style="list-style-type: none"> Incidental ingestion Dermal contact Inhalation of soil particles 	<ul style="list-style-type: none"> Potentially complete pathway. Exposure routes: <ul style="list-style-type: none"> Incidental ingestion Dermal contact Inhalation of soil particles 	<ul style="list-style-type: none"> Potentially complete pathway. Exposure routes: <ul style="list-style-type: none"> Ingestion Direct Contact 	<ul style="list-style-type: none"> Metals and explosives data are needed. 	One surface soil sample will be collected at the anti-tank minefield area. The sample will be analyzed for explosives (including nitroglycerin and pentaerythritol tetranitrate [PETN]) and select metals (chromium, iron, copper, lead, manganese, and nickel). One surface soil sample will be collected near the sand dunes in Christmas Valley. The sample will be analyzed for explosives (including nitroglycerin) and select metals (chromium, iron, copper, lead, manganese, and nickel). Two contingent surface soil samples will be collected in the area of the maneuvers, if warranted. The sample will be analyzed for explosives (including nitroglycerin) and select metals (chromium, iron, copper, lead, manganese, and nickel).
			Sediment/Surface Water <ul style="list-style-type: none"> Potentially affected media – numerous streams and rivers Potential metals contamination Spotting charges and fuze do not contain hazardous substances Fate & Transport: via surface runoff from impacted soil 	<ul style="list-style-type: none"> Potentially complete pathway. Exposure routes: <ul style="list-style-type: none"> Incidental ingestion Dermal contact Inhalation of surface water 	<ul style="list-style-type: none"> Potentially complete pathway. Exposure routes: <ul style="list-style-type: none"> Incidental ingestion Dermal contact Inhalation of surface water 	<ul style="list-style-type: none"> Potentially complete pathway. Exposure routes: <ul style="list-style-type: none"> Ingestion Direct Contact 	<ul style="list-style-type: none"> Metals and explosives data are needed. 	<ul style="list-style-type: none"> No surface water samples will be collected One sediment sample will be collected from a water collection area. The sample will be analyzed for select metals (chromium, copper, iron, lead, manganese, and nickel) and explosives, including nitroglycerin and PETN
			Groundwater <ul style="list-style-type: none"> Potentially affected media due to leaching of contaminants through the soil. 	<ul style="list-style-type: none"> Potentially complete pathway. Exposure routes: <ul style="list-style-type: none"> Incidental ingestion Dermal contact Inhalation of groundwater 	<ul style="list-style-type: none"> Potentially complete pathway. Exposure routes: <ul style="list-style-type: none"> Incidental ingestion Dermal contact Inhalation of groundwater 	<ul style="list-style-type: none"> Potentially complete pathway. Exposure routes: <ul style="list-style-type: none"> Ingestion Direct Contact 	<ul style="list-style-type: none"> Metals and explosives data are needed. 	<ul style="list-style-type: none"> No groundwater samples will be collected.
			Air <ul style="list-style-type: none"> Potentially affected media due to blowing soil. 	Potentially complete Pathway Exposure routes: Inhalation	Potentially complete Pathway Exposure routes: Inhalation	Potentially complete Pathway Exposure routes: Inhalation	<ul style="list-style-type: none"> Metals and explosives data are needed. 	Will use soil analytical data in risk screening

**Table 4. Proposed Sampling Approach
Northwest Maneuver Area**

Area of Concern	Media	Samples					
			Select Metals	TAL Metals	Explosives	PETN	Nitroglycerin
NWMA	Soil	4	4	0	4	4	4
	Sediment	1	1	0	1	1	1
	Surface Water	0	0	0	0	0	0
	Groundwater	0	0	0	0	0	0
Background	Soil	10	0	10	0	0	0
	Sediment	1	0	1	0	0	0
	Surface Water	0	0	0	0	0	0
	Groundwater	0	0	0	0	0	0
Totals			5	11	5	5	5
QC Required Samples	Media	Samples	Select Metals	TAL Metals	Explosives	PETN	Nitroglycerin
Duplicate	Soil	3	1	2	1	1	1
	Sediment	1	0	1	0	0	0
	Surface Water	0	0	0	0	0	0
	Groundwater	0	0	0	0	0	0
Totals			1	3	1	1	1
MS/MSD	Soil	1	1	1	1	1	1
	Sediment	0	0	0	0	0	0
	Surface Water	0	0	0	0	0	0
	Groundwater	0	0	0	0	0	0
Totals			1	1	1	1	1

Notes:

- 1) In addition to the QC samples shown above, temperature blanks will be submitted with samples, one blank per cooler.
- 2) Metals by SW-846 6020A. Explosives by SW-846 8330A. PETN and Nitroglycerin by SW-845 8330A (Modified).
- 3) Select metals are aluminum, chromium, copper, iron, lead, manganese, and nickel.

MS/MSD - matrix spike/matrix spike duplicate

PETN - pentaerythritol tetranitrate

QC - quality control

TAL - Target Analyte List

Table 5
Human Health Screening Criteria for Soil/Sediment at Oregon Sites
Northwest Maneuver Area

Analyte	Abbreviation	CAS No.	Region 9 Human Health Screening Values ^a			Laboratory Method Detection Limit (mg/kg)
			Residential PRG ^b (mg/kg) ^b	SSLs ^c DAF=1 (mg/kg)	SSLs ^c DAF=20 (mg/kg)	
Aluminum	Al	7429-90-5	76,000			20.0
Chromium ^e	Cr	7440-47-3	210	2	38	1.0
Copper	Cu	7440-50-8	3,100			1.0
Iron	Fe	7439-89-6	23,000			15.0
Lead	Pb	7439-92-1	400 ^f			1.0
Manganese	Mn	7439-96-5	1,800			25.0
Magnesium	Mg	7439-95-4				0.5
Mercury	Hg	7439-97-6	23			0.5
Molybdenum	Mo	7439-98-7	390			0.06
Nickel	Ni	7440-02-0	1,600	7	130	1.0
Zinc	Zn	7440-66-6	23,000	620	12,000	2.0
Hexahydro-1,3,5-trinitro-1,3,5-triazine	RDX	121-82-4	4.4			0.075
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	HMX	2691-41-0	3,100			0.050
2,4,6-Trinitrotoluene	2,4,6-TNT	118-96-7	16			0.040
1,3,5-Trinitrobenzene	1,3,5-TNB	99-35-4	1,800			0.020
1,3-Dinitrobenzene	1,3-DNB	99-65-0	6.1			0.020
2,4-Dinitrotoluene ^d	2,4-DNT	121-14-2	0.72	0.00004	0.0008	0.040
2,6-Dinitrotoluene ^d	2,6-DNT	606-20-2	0.72	0.00004	0.0008	0.040
2-Amino-4,6-dinitrotoluene	2-Am-DNT	35572-78-2	12			0.040
2-Nitrotoluene	2-NT	88-72-2	0.88			0.075
3-Nitrotoluene	3-NT	99-08-1	730			0.050
4-Amino-2,6-dinitrotoluene	4-Am-DNT	19406-51-0	12			0.040
4-Nitrotoluene	4-NT	99-99-0	12			0.040
Nitrobenzene	NB	98-05-3	20	0.007	0.1	0.020
Nitroglycerin	NG	55-63-0	35			
PETN	PETN	78-11-5	0.50	NVA	NVA	
Methyl-2,4,6-trinitrophenylnitramine	Tetryl	479-45-8	610			0.065

DAF = Dilution Attenuation Factor. mg/kg = milligrams per kilogram.
PRG = Preliminary Remediation Goal. mg/L = milligrams per liter.
SSL = Soil Screening Level.

a If laboratory cannot meet any of the preferred QLs with routine SW 846 methodology (as supported by MDLs that are no greater than 1/3 QL), laboratory's QL must be identified in laboratory submittal as failing to meet the QL. Some screening values cannot be obtained with routine methodology to the QL. In those cases, the QL achievable with a routine SW 846 methodology would be accepted.

b PRGs from Region 9 PRG Table dated October 2004 and addendum dated 28 December 2004, based on single chemical.

c SSLs from Region 9 PRG Table dated October 2004 and revision note dated 28 December 2004.

d Carcinogenic DNT mixture values used if more conservative than noncarcinogenic isomer-specific values.

e Total chromium values used.

f Values listed from Oregon risk-based concentrations: 400 mg/kg (residential)

Table 6
Human Health Screening Criteria for Groundwater at Oregon Sites^a
Northwest Maneuver Area

Analyte	Abbreviation	CAS No.	Laboratory Method Detection Limit (µg/L)	Region 9 Tap Water PRG ^b (µg/L)	Federal Drinking Water Criteria MCLs ^c (µg/L)
Hexahydro-1,3,5-trinitro-1,3,5-triazine	RDX	121-82-4	0.8	0.61	
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	HMX	2691-41-0	0.4	1,800	
2,4,6-Trinitrotoluene	2,4,6-TNT	118-96-7	0.3	2.2	
1,3,5-Trinitrobenzene	1,3,5-TNB	99-35-4	0.2	1,100	
1,3-Dinitrobenzene	1,3-DNB	99-65-0	0.2	3.6	
2,4-Dinitrotoluene ^d	2,4-DNT	121-14-2	0.3	0.099	
2,6-Dinitrotoluene ^d	2,6-DNT	606-20-2	0.3	0.099	
2-Amino-4,6-dinitrotoluene	2-Am-DNT	35572-78-2	0.2	7.3	
2-Nitrotoluene	2-NT	88-72-2	0.4	0.049	
3-Nitrotoluene	3-NT	99-08-1	0.8	120	
4-Amino-2,6-dinitrotoluene	4-Am-DNT	19406-51-0	0.2	7.3	
4-Nitrotoluene	4-NT	99-99-0	0.4	0.66	
Nitrobenzene	NB	98-05-3	0.2	3.4	
Methyl-2,4,6-trinitrophenylnitramine	Tetryl	479-45-8	0.75	360	
Nitroglycerin	NG	55-63-0	0.5		
PETN	PETN	78-11-5	1.3		
Aluminum	Al	7429-90-5	60	36,000	50 ^e
Chromium ^f	Cr	7440-47-3	2.0	110	100
Copper	Cu	7440-50-8	3.0	1,500	1,000 ^e 1,300 ^g
Iron	Fe	7439-89-6	5.0	11,000	300 ^e
Lead	Pb	7439-92-1	1.0		15 ^g
Magnesium	Mg	7439-95-4	100		
Manganese	Mn	7439-96-5	2.0	880	50 ^e
Mercury	Hg	7439-97-6	0.3		
Molybdenum	Mo	7439-98-7	5.0	180	
Nickel	Ni	7440-02-0	1.0	730	
Zinc	Zn	7440-66-6	0.1	11,000	5,000 ^e

Table 6 (Cont.)
Human Health Screening Criteria for Groundwater at Oregon Sites
Northwest Maneuver Area

MCL = Maximum Contaminant Level

PRG = Preliminary Remediation Goal

µg/L = micrograms per liter

a If laboratory cannot meet these QLs with routine SW 846 methodology (as supported by MDLs that are no greater than 1/3 QL), laboratory's QL must be identified in laboratory submittal as failing to meet the QL. Some screening values cannot be obtained with routine methodology to the QL.

Note that no surface water samples are planned at this time. If surface water is collected, additional human health screening criteria will be compiled.

b Region 9 PRG Table dated October 2004 and revision note dated 28 December 2004, based on single chemical.

c Primary MCL from the 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004, is listed unless otherwise indicated.

d Carcinogenic DNT mixture values used if more conservative than noncarcinogenic isomer-specific values.

e Secondary MCL from the 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004.

f Total chromium values used if available.

g Action level from the 2004 Edition of the Drinking Water Standards and Health Advisories, dated Winter 2004.

Table 7
Human Health Screening Criteria for Surface Water at Oregon Sites^a
Northwest Maneuver Area

Analyte	Abbreviation	CAS Number	USEPA Region 9 Tap Water PRG ^b (µg/L)	Oregon DEQ Water Quality Criteria ^c	
				Water and Fish Ingestion ^d (µg/L)	Fish Consumption Only ^e (µg/L)
Hexahydro-1,3,5-trinitro-1,3,5-triazine	RDX	121-82-4	0.61		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	HMX	2691-41-0	1,800		
2,4,6-Trinitrotoluene	2,4,6-TNT	118-96-7	2.2		
1,3,5-Trinitrobenzene	1,3,5-TNB	99-35-4	1,100		
1,3-Dinitrobenzene	1,3-DNB	99-65-0	3.6		
2,4-Dinitrotoluene ^g	2,4-DNT	121-14-2	0.099	0.11 ^h	9.1 ^h
2,6-Dinitrotoluene ^g	2,6-DNT	606-20-2	0.099		
2-Amino-4,6-dinitrotoluene	2-Am-DNT	35572-78-2	7.3		
2-Nitrotoluene	2-NT	88-72-2	0.049		
3-Nitrotoluene	3-NT	99-08-1	120		
4-Amino-2,6-dinitrotoluene	4-Am-DNT	19406-51-0	7.3		
4-Nitrotoluene	4-NT	99-99-0	0.66		
Nitrobenzene	NB	98-05-3	3.4	19,800	
Nitroglycerin	NG	55-63-0	4.8		
Methyl-2,4,6-trinitrophenylnitramine	Tetryl	479-45-8	360		
Pentaerythritol tetranitrate	PETN	78-11-5			
Aluminum	Al	7429-90-5	36,000		
Chromium ⁱ	Cr	7440-47-3	110	50	
Copper	Cu	7440-50-8	1,500		
Iron	Fe	7439-89-6	11,000	300	
Lead	Pb	7439-92-1		50	
Magnesium	Mg	7439-95-4			
Manganese	Mn	7439-96-5	880	50	100
Mercury	Hg	7439-97-6	11	0.144	0.146
Molybdenum	Mo	7439-98-7	180		
Nickel	Ni	7440-02-0	730	13.4	100
Zinc	Zn	7440-66-6	11,000		

Table 7
Human Health Screening Criteria for Surface Water at Oregon Sites^a
Northwest Maneuver Area

MCL = Maximum Contaminant Level
PRG = Preliminary Remediation Goal
µg/L = micrograms per liter

^a If laboratory cannot meet these QLs with routine SW 846 methodology (as supported by MDLs that are no greater than 1/3 QL), laboratory's QL must be identified in laboratory submittal as failing to meet the QL. Some screening values cannot be obtained with routine methodology to the QL.

^b Preliminary Remediation Goal (PRG) table, dated October 2004 and revision note dated 28 December 2004. Values are based on a single chemical.

^c Values from Oregon DEQ Water Quality Criteria (OAR 340 Division 41, Table 20).

^d Values represent the maximum ambient water concentration for consumption of both contaminated water and fish or other aquatic organisms.

^e Values represent the maximum ambient water concentration for consumption of fish or other aquatic organisms.

^f Values represent the drinking water Maximum Contaminant Level.

^g Carcinogenic DNT mixture values used if more conservative than noncarcinogenic isomer-specific values.

^h Value is based on a cancer risk of 1.0×10^{-6} .

ⁱ Because the form of chromium has not yet been determined, the values for Chromium VI are used as a conservative measure.

^j Value based on memorandum from Department of Defense entitled "Policy on DoD Required Actions Related to Perchlorate." Dated 26 January 2006.

Table 8
Selection of Ecological Soil Screening Toxicity Values for Constituents of Potential Ecological Concern (Oregon Sites)
Northwest Maneuver Area

Parameter	ODEQ Level II Screening Level ^a	Proposed Benchmarks									Potential Bio accumulative Constituent? ^h	Final Ecological Screening Value Soil ⁱ (mg/kg)	Practical Quantitation Limit (mg/kg)
	Lowest Value for Plants/Inverts./ Birds/Mammals (mg/kg)	Region 5 ESLs ^b (2003) (mg/kg)	Region 7 ^c (mg/kg)	Region 8 ^d (mg/kg)	Region 10 ^e (mg/kg)	Other Values: Talmage et al. (1999) ^f or LANL (2005) ^g (mg/kg)							
Metals/Inorganics													
Aluminum	50	NVA	50	EPA-R4	NVA		50	EPA-R4	5.5	LANL		50	20.0
Chromium (total)	0.4	0.4	26	SSL	26	SSL	26	SSL	2.3	LANL	Yes	0.4	1.0
Copper	50	5.4	60	ORNL	190	Dutch	60	ORNL	10	LANL	Yes	50	1.0
Iron	10	NVA	200	EPA-R4	NVA		200	EPA-R4	NVA			10	15.0
Lead	16	0.0537	11	SSL	11	SSL	11	SSL	14	LANL	Yes	16	1.0
Magnesium	NVA	NVA	440000	EPA-R4	NVA		440000	EPA-R4	NVA			NVA/Nutrient	25.0
Manganese	100	NVA	100	EPA-R4	NVA		100	EPA-R4	50	LANL		100	0.5
Mercury	0.1	0.1	0.00051	ORNL	0.00051	ORNL	0.00051	ORNL	0.013	LANL	Yes	0.1	0.06
Molybdenum	2	NVA	2	ORNL	2	ORNL	2	ORNL	NVA			2	0.5
Nickel	30	13.6	30	ORNL	30	ORNL	30	ORNL	20	LANL	Yes	30	1.0
Zinc	50	6.62	8.5	ORNL	8.5	ORNL	8.5	ORNL	10	LANL	Yes	50	2.0

Table 8 (Cont.)
Selection of Ecological Soil Screening Toxicity Values for Constituents of Potential Ecological Concern (Oregon Sites)
Northwest Maneuver Area

Parameter	ODEQ Level II Screening Level ^a	Proposed Benchmarks									Potential Bio accumulative Constituent? ^h	Final Ecological Screening Value Soil ⁱ (mg/kg)	Practical Quantitation Limit (mg/kg)
	Lowest Value for Plants/Inverts./ Birds/Mammals (mg/kg)	Region 5 ESLs ^b (2003) (mg/kg)	Region 7 ^c (mg/kg)	Region 8 ^d (mg/kg)	Region 10 ^e (mg/kg)	Other Values: Talmage et al. (1999) ^f or LANL (2005) ^g (mg/kg)							
Explosive													
2,4-Dinitrotoluene	NVA	1.28	1.28	EPA-R4	NVA	1.28	EPA-R4	0.52	LANL		1.28	0.040	
2,6-Dinitrotoluene	NVA	0.0328	0.0328	EPA-R4	NVA	0.0328	EPA-R4	0.37	LANL		0.0328	0.040	
2-Amino-4,6-Dinitrotoluene	NVA	NVA	NVA		NVA	NVA		2.1	LANL		2.1	0.040	
4-Amino-2,6-Dinitrotoluene	NVA	NVA	NVA		NVA	NVA		0.73	LANL		0.73	0.040	
1,3-Dinitrobenzene	NVA	0.655	0.655	EPA-R4	NVA	0.655	EPA-R4	0.073	LANL		0.655	0.020	
HMX	NVA	NVA	NVA		NVA	NVA		27	LANL		27	0.050	
Nitrobenzene	8	1.31	1.31	EPA-R4	NVA	1.31	EPA-R4	2.2	LANL		8	0.020	
RDX	NVA	NVA	NVA		NVA	NVA		7.5	LANL		7.5	0.075	
1,3,5-Trinitrobenzene	NVA	0.376	0.376	EPA-R4	NVA	0.376	EPA-R4	6.6	LANL		0.376	0.020	
2,4,6-Trinitrotoluene	NVA	NVA	NVA		NVA	NVA		6.4	LANL		6.4	0.040	
2-Nitrotoluene	NVA	NVA	NVA		NVA	NVA		2.0	LANL		2.0	0.075	
3-Nitrotoluene	NVA	NVA	NVA		NVA	NVA		2.4	LANL		2.4	0.050	
4-Nitrotoluene	NVA	NVA	NVA		NVA	NVA		4.4	LANL		4.4	0.040	
Tetryl	NVA	NVA	NVA		NVA	NVA		0.99	LANL		0.99	0.065	
PETN	NVA	NVA	NVA		NVA	NVA		8600	LANL		8600	0.50	
Nitroglycerin	NVA	NVA	NVA		NVA	NVA		71	LANL		71	10	

NVA: No value available

Table 8 (Cont.)
Selection of Ecological Soil Screening Toxicity Values for Constituents of Potential Ecological Concern (Oregon Sites)
Northwest Maneuver Area

aOregon Department of Environmental Quality Screening Level Values (December 2001).

bEcological Screening Levels (ESLs), U.S.EPA Region 5, August 2003.

cUSEPA Region 7: Catherine Wooster-Brown (Eco Risk Assessor) recommends the following hierarchy: USEPA EcoSSLs; ORNL Efrogmson values; USEPA Region 4 values; other published values.

dUSEPA Region 8: Dale Hoff (Eco Risk Assessor) recommends the following hierarchy: USEPA SSLs; Dutch Intervention Values or ORNL Efrogmson values.

eUSEPA Region 10: Joseph Goulet (Eco Risk Assessor) says Region 10 has no recommended hierarchy, therefore, values from the USEPA Region 7 Approach were used.

fTalmage, S.S., D.M. Opresko, C.J. Maxwell, C.J.E. Welsh, F.M. Cretella, P.H. Reno, and F.B. Daniel, 1999, Nitroaromatic Munition Compounds: Environmental Effects and Screening Values, **'Revisions Environmental Contaminant Toxicology.'**

gLos Alamos National Laboratory (LANL), Eco Risk Database, Release 2.2, September 2005.

hPotential bioaccumulative constituents will be evaluated in more detail, as some screening values do not take into account bioaccumulation. Potential bioaccumulative potential from: Bioaccumulation and Interpretation for the Purposes of Sediment Quality Assessment: Status and Needs (USEPA, 2000) and ODEQ EQSLVs (ODEQ, 2001).

iFinal Screening Value selected using the following hierarchy:

1. State Value (Oregon)
2. USEPA Region State Located In (USEPA Region 10)
3. Lower of Talmage et al. (1999) or LANL (2005) values.

EPA-R4=USEPA Region 4

LANL= Los Alamos National Laboratory

SSL=USEPA Eco Soil Screening Levels

Dutch=Dutch Intervention Values

ORNL= Oak Ridge National Laboratory Ecological PRGs (Efrogmson et al)

Other References:

U.S. Environmental Protection Agency, 2005, Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs), Office of Solid Waste and Emergency Response, website version last updated March 15, 2005: <http://www.epa.gov/ecotox/ecossil>.

U.S. Environmental Protection Agency, 2001, Supplemental Guidance to RAGS: Region 4 Bulletins, Ecological Risk Assessment. Originally published November 1995.

Website version last updated November 30, 2001: <http://www.epa.gov/region4/waste/ots/ecolbul.htm>.

Efrogmson, R.A., Suter II, G.W., Sample, B.E. and Jones, D.S., 1997. Preliminary Remediation Goals for Ecological Endpoints. Lockheed Martin Energy Systems, Inc. (ORNL) ES/ER/TM-162/R2.

Dutch Intervention Values:

Swartjes, F.A. 1999. Risk-based Assessment of Soil and Groundwater Quality in the Netherlands: Standards and Remediation Urgency. Risk Analysis 19(6): 1235-1249
The Netherlands Ministry of Housing, Spatial Planning and Environment's Circular on target values and intervention values for soil remediation

http://www2.minvrom.nl/Docs/internationaal/S_I2000.pdf and Annex A:

Target Values, Soil Remediation Intervention Values and Indicative Levels for Serious Contamination http://www2.minvrom.nl/Docs/internationaal/annexS_I2000.pdf were also consulted.

Draft Worksheets

*Site Inspection
Northwest Maneuver Area*

*Technical Project Planning Meeting
April 26, 2007*

Site Information Worksheet

Site: Northwest Maneuver Area

Project: Northwest Maneuver Area TPP Meeting Package

	Site Information Needed ^a	Suggested Means to Obtain Site Information	Potential Source(s) of Site Information	Responsible for Obtaining	Deadline for Obtaining Site Information
1	Schedule for Sampling	Consultation	ODEQ and landowners	Shaw	Prior to field work
2	Access Agreements	Rights of Entry requests	Landowners	USACE	Prior to field work
3	Areas of Cultural Significance within AOC	SHPO	Phone SHPO	Shaw	For inclusion in final TPP Memo

Munitions Response Site Prioritization Protocol (MRSPP) Data Gaps
32 CRF Part 179

Installation: Northwest Maneuver Area
AOC: Anti-tank Minefield
RMIS Range ID: F10OR020801R01

Module	Table No.	Table Description	Data Gap	Potential Source of Information to Fill Data Gap	No Data Gap	Description of Known Data
Explosive Hazard Evaluation (EHE)	1	Munitions Type	x			M1B1 practice anti-tank mine, Mk 43 45-lb practice bomb with black powder, small arms (.30 caliber and .45 caliber)
	2	Source of Hazard	x			Troop maneuver area. Source of discovered ordnance unknown.
	3	Location of Munitions	x			Historical evidence indicates ordnance has been found on the Northwest Maneuver Area. .
	4	Ease of Access	x			Partial barrier
	5	Status of Property			x	Non-DoD control
	6	Population Density			x	< 100 persons per square mile
	7	Population Near Hazard			x	0 inhabited structures w/in 2 miles
	8	Activities/Structures			x	Agricultural - irrigated crops and livestock grazing
	9	Ecological and/or Cultural Resources		confirm State Historical Preservation Office	x	Ecological resources present
	10	EHE Module Score				
Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE)	11	CWM Configuration			x	Historical evidence indicates that CWM are not present
	12	Sources of CWM			x	Historical evidence indicates that CWM are not present
	13	Location of CWM			x	Historical evidence indicates that CWM are not present
	14	Ease of Access			x	No barrier
	15	Status of Property			x	Non-DoD control
	16	Population Density			x	< 100 persons per square mile
	17	Population Near Hazard			x	0 inhabited structures w/in 2 miles
	18	Activities/Structures			x	Agricultural - livestock grazing
	19	Ecological and/or Cultural Resources			x	Ecological resources present
	20	CHE Module Score				
Health Hazard Evaluation (HHE)	21	HHE Factor Levels	x	Contaminant hazard evaluation pending analytical results		
	22	HHE Three-Letter Combination Levels	x	Contaminant hazard evaluation pending analytical results		
	23	HHE Module Ratings	x	Contaminant hazard evaluation pending analytical results		
	24	HHE Module Rating	x	Contaminant hazard evaluation pending analytical results		
MRS Priority	25	MRS Priority (Based on Highest Hazard Evaluation Module Rating)	x	Evaluation pending filling of data gaps		

To be completed by USACE once all data gaps are filled.

Northwest Maneuver Area HRS Data Gaps

Information required to complete the MEC-HRS data collection form:

Item	Number	Comment – Missing Data Element
1	1.8	Confirm the latitude / longitude of potential source(s) and the accuracy of the information (in meters)
2		Source scale (i.e., 1:24,000, etc.)
3	1.12	Site Permits
4	2.3	Confirm no tribal lands within 4 miles or surface water within 15 miles
5	2.4	Confirm if there are other NPL sites within 1 mile of the site
6	2.5	Confirm property owners
7	5.3	Population within 1 mile, within 4 miles
8	6	Water use (GW within 4 miles, SW within 15 miles)
9	6.1	Total drinking water population served
10	6.2	Type of drinking water supply system (GW or SW?)
11	6.3	Other water uses of GW within 4 miles
12	6.4	Depth to aquifer within 4 miles
13	7.1	Confirm existence of sensitive or potentially vulnerable environment